Progress Report

FOR THE YEAR ENDED JUNE 1958

ROYAL ONTARIO MUSEUM

DIVISION OF ZOOLOGY AND PALAEONTOLOGY

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PROGRESS REPORT

FOR THE YEAR ENDED JUNE 1958

CONTENTS

STAFF

(Part-time assistants and student-assistants are not listed)

Non-departmental

F. A. Urquhart, M.A., Ph.D., Head

Miss M. Easto, Secretary (resignation, July 1, 1958)

Mrs. M. E. Fee, Secretary (from June 1, 1958)

Miss E. R. McClure, Chief Librarian (resignation, June 1, 1958)

Miss E. McCormick, Chief Librarian (from June 1, 1958)

R. R. Hornell, Chief Technician (Palaeozoology)

E. H. Taylor, Chief Technician (Zoology)

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G. B. Wiggins, M. A., Ph. D., Assistant Curator

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A. Reid, Associate Chief (resignation July 1, 1958)

A. Gatti, Artist

INTRODUCTORY REMARKS

This report was prepared primarily for the Director and members of the Board of the Royal Ontario Museum. It also serves to inform our colleagues in other institutions about our research work, the growth of our research collections, and gallery displays.

The growth of our research collections depends upon the acquisition of well-documented private collections and field expeditions. During this past year we were most fortunate in procuring Mr. Munro's collection of birds and mammals, numbering some nine thousand specimens. Although only brief mention of this important acquisition is made in the reports of the Departments of Mammalogy and Ornithology, it will be dealt with in more detail in the report for next year when its importance as an addition to our present research collection will be more fully realized. As a result of an expedition to Peru, many valuable Pleistocene vertebrate specimens were added to our collection; we anticipate the publication of a number of research papers in the near future dealing with this material.

The importance of gallery displays as an educational medium cannot be overemphasized. Seven years ago we embarked on a program of changing our galleries from a purely phylogenetic series of animals to attractive, well-illuminated descriptive exhibits. As part of this program, the gallery of fishes was installed. Thanks to the financial support of the Carling Conservation Club we have been able to proceed with the installation of a gallery of reptiles.

I would ask you to examine the reports of the various departments for a description of the nature of the work now in progress and what has been accomplished during the past year.

F. A. Urquhart

DEPARTMENT OF VERTEBRATE PALAEOZOOLOGY

by A. G. Edmund

During July and August the Associate and Assistant Curators visited most of the known fossil vertebrate collecting localities in western Canada. Mr. Sternberg was able to point out to Dr. Edmund the exact sites from which a large number of important specimens were taken. Much of the time was spent in prospecting at each locality and a few specimens, including a large Cretaceous turtle, were collected. Notes, marked maps and photographs, however, were the main products of the trip, and these will be used in drawing up plans for future field work.

A visit was paid to the dinosaur museum at Drumheller and arrangements made for mutual co-operation between our institutions; a model of a reconstructed dinosaur is now being sent to them for exhibition. The fine new museum at Regina was also visited, and notes were made and photographs taken of their interesting palaeontological displays.

One of the largest and time-consuming projects this year was the moving of a large amount of our equipment and stored specimens to new quarters, and the reorganization of offices and work space. Several weeks were spent in moving the dinosaur research material into storage in the basement laboratory. The research centre for vertebrate palaeozoology is now in the suite of offices in the south end, second floor, with rooms for sorting and study as well as facilities for special preparation, radiography, photography and cataloguing. The library of vertebrate palaeozoology is housed in the Assistant Curator's office with easy access to the Department of Invertebrate Palaeozoology library. While this new arrangement reduces the amount of space available to the Department, its added convenience has been a recompense. Unfortunately, storage space for our rapidly expanding collections is becoming a problem, and a major reorganization of the storage and laboratory facilities may be needed in the near future.

In September two crates of specimens were received from Dr. G. H. MacDonald and Mr. R. Fraleigh of the International Petroleum Co. Ltd., Talara, Peru. These specimens (the remains of extinct animals) were collected in a locality near Talara where pitch is quarried for road material, and a preliminary examination

showed them to be well preserved and representative of a surprisingly rich Pleistocene mammal and bird fauna. As a result of further negotiations with the International Petroleum Company it was decided to organize a field party to collect further material. The party, consisting of Dr. R. R. H. Lemon, Assistant Curator of Invertebrate Palaeozoology, Mr. R. R. Hornell, Chief Technician, and the Assistant Curator left Toronto in mid-January. As a result of six weeks' intensive work, four tons of scientific specimens were collected and shipped back to the Museum. Throughout the party's stay in Peru the most generous co-operation and help was extended by the International Petroleum Company, and the success of the expedition was due very largely to the assistance so readily given by all departments.

The task of preparing the Peruvian material is now under way. At the present time the skulls of a lion and a sabre-tooth cat have been prepared by the Chief Technician, while the Research Assistant has cleaned, sorted and catalogued hundreds of small specimens. This assemblage, representing a fauna similar but not identical to that of Rancho La Brea, Los Angeles, is probably the best collection of Pleistocene vertebrate material ever obtained from a single locality in South America, and an adequate study of it is expected to take several years. Collections were also made of the plant and insect material associated with the vertebrate material and these, together with many lithologic samples, should provide invaluable information on the ecologic conditions obtaining at the time the tar seeps were active in trapping the vertebrates.

Some progress has been made by the Associate Curator in the preparation of our exhibition skeleton of the fin-backed reptile Edaphosaurus, but because of his well-known skill with casting techniques much of his time has been spent assisting the Department of Art and Exhibits in the preparation of casts for the new gallery of modern reptiles. Casts of several fossil specimens were made from moulds supplied by Dr. Donald Baird of Princeton University. A small collection of fossil fish was sent to Mr. Paul H. Soll of Seattle, Washington, in exchange for a small collection of invertebrate fossils. A selection of dinosaur bones and photographs was loaned to the children's library at Oakville for a temporary exhibit.

The Assistant Curator is continuing his research on the replacement of teeth in fossil and modern reptiles, and the manuscript is now in an advanced stage of preparation. A paper on the replacement of teeth in the Crocodilia is partly written, describing the results of over three years of periodic radiographing of live alligators.

Both curators attended the annual meetings of the Society of Vertebrate Palaeontology in Philadelphia and Atlantic City. The Assistant Curator presented an informal paper on dinosaur dentition, and later visited the Department of Geology, Princeton University, and the Department of Vertebrate Palaeontology, American Museum of Natural History, where specimens were studied.

Miss Elvira Hammell, appointed Research Assistant in this Department, has been engaged on such duties as sorting and cataloguing specimens, assisting in radiography and in compiling bibliographic references.

The Assistant Curator presented part of the University course, Ecology and Evolution, Zoology 30.

DEPARTMENT OF MAMMALOGY

by R. L. Peterson

Work continued during the past year on a manuscript for a book dealing with the mammals of eastern Canada. Some delay in the anticipated progress for the year was brought about by the preparation and teaching by the Curator of a university course in Vertebrate Palaeozoology (Geological Sciences 13a and b) in the absence of the Curatorial staff of that department.

Distributional records, based on specimens within the Department and on published literature, have been plotted on base maps; these maps are now up to date. During a visit to the Natural History Branch of the National Museum of Canada records were made of all specimens from eastern Canada contained in their collections. For many species these will be the first comprehensive and accurate maps to be prepared for the area covered.

The first draft of the text manuscript is approximately two-thirds complete.

Some progress was made on the illustrations to be included. All recent species of mammals, including whales and other marine mammals, are to be illustrated. Detailed drawings of the skull are to be included as well as special illustrations of other diagnostic features and characteristic studies from life. It is hoped that a number of full colour illustrations will be included if it is possible to obtain sufficient financial assistance to cover the added expense.

Studies of animal variation in the genus Vulpes were completed by Dr. C. S. Churcher under the direction of the Curator. This work formed the basis of Dr. Churcher's thesis for the Ph. D. degree which was awarded to him during the fall term. Further revision of parts of this work has already been carried out, with one paper having been accepted for publication and a second in final draft.

In addition to the course in Vertebrate Palaeozoology, the Curator conducted a graduate course in Mammalogy and the mammal portion of undergraduate course Zoology 25.

Editorial assistance and critical identification of specimens was carried out for Mr. W. Beck of the University

of Saskatchewan in connection with his manuscript A Guide to Saskatchewan Mammals.

Considerable time was again devoted to the identification of several hundred small mammals for the Ontario Department of Lands and Forests in connection with their annual province-wide small mammal survey.

The purchase of the Munro Collection added 2,723 specimens of outstanding quality and research significance to our collection. This will be dealt with in more detail in next year's report.

A total of 340 specimens was received during the year, including 264 by donation, 60 by purchase, 15 by staff collecting and 5 by exchange. Approximately 500 specimens were catalogued and processed into the research collection. A number of genera new to our collections was acquired through the purchase of 58 African mammals from Mr. J. B. Foster and Mr. R. Bateman, the donation of 11 African mammals by Dr. C. S. Churcher, and the donation of a South American fox by Dr. F. Von Spillman. An exchange with the U.S. National Museum also enlarged our coverage of eastern Canadian mammals. Five complete specimens of harbour seals, Phoca vitulina, were donated by Dr. V. D. Vladykov.

The Curator attended the annual meeting of the American Society of Mammalogists at the University of Kansas, where he presented a paper and was re-elected as Recording Secretary. He also served as a judge for the Thomas Adams Big Game Competition and participated in radio and television programmes dealing with mammals.

DEPARTMENT OF ORNITHOLOGY

by L. L. Snyder

A number of desirable study specimens has been acquired during the year through donation and exchange. One of the most outstanding acquisitions was the purchase of the Munro collection numbering 8,299 specimens of great importance, from the research point of view, to our present collection. The nature of this collection and its importance will be considered in detail in the Progress Report for next year. A total of 344 skins and osteological specimens was received by donation; of these, 290 were completed preparations and 54 were processed in our laboratory. Outstanding among the prepared specimens received were 77 skins of east African birds from Mr. Charles Long, resident in Nyasaland; 186 skins from southern Ontario, presented by Mr. R. Arthur Smith, of Toronto; 19 skins from Alberta, donated by Mr. O. D. Boggs, of Calgary; three Passenger Pigeons, two from Mr. Thomas K. Fleming, of Toronto, and one from Mr. Alfred N. Phillips, of Laurel, Ontario; and miscellaneous bones of the extinct Great Auk, received from Mr. D. H. Pinlott, of St. John's, Newfoundland. Noteworthy additions received through exchange were two specimens of the presumedly extinct Eskimo Curlew, received from the Natural History Museum, Vienna, Austria; 100 common birds of Germany from the Koenig Museum, Bonn, West Germany; and several bird skins, including a specimen of the extinct Carolina Parakeet, received from Mr. W. H. Barrow, of England.

Gratifying progress has been made in cataloguing the Fleming Collection received in 1940. Mr. Laszlo J. Szijj has been available through extra-clerical funds and, though employed only part-time, he has catalogued and labelled approximately 2,100 specimens, the identity of each being checked in the light of recent literature. Mr. Baillie has catalogued current accessions and plotted on the Department's master maps such distributional records as were represented by the year's accessions.

In addition to the curatorial activities connected with the growth and care of the research collection, studies are continuing in connection with a technical treatise on the birds of the province. This study by the Curator will be the first comprehensive treatise on Ontario birds since 1894.

The Department has had the privilege of facilitating the investigations of other researchers during the year, a function we are pleased to fulfil and one for which we receive frequent acknowledgement in the publications of authors. During the year 59 specimens were lent to the National Museum of Canada for study, and 34 specimens were lent to Dr. David K. Wetherby of Omaha, Nebraska.

It has been found advisable to maintain a bird-room register of non-staff workers who request the use of the reference collection in their personal investigations. This practice was commenced late in the current year; there were fifty signatures in the register within four months. The procedure and approach in requiring persons to register seems to appeal to ornithological curators in other museums. Our request is both friendly and candid, and on the outside of the registration book, to which visitors are directed when they ask to refer to the collection, is the statement: "Please register: Your signature provides a record of use, your assurance of reasonable care in handling material, and your endorsement of the need and value of collecting specimens in the pursuit of knowledge."

Certain services rendered which may be classified as aiding research have included identifications made on request. For example, a series of birds' nests was identified for the Entomological Laboratory of Belleville in connection with a project concerned with insect control. A number of bird bones found in kitchen middens was identified for a worker in the Museum's Division of Art and Archaeology.

Certain services rendered during the year were of a professional nature though not directly concerned with research. These included a conference with visiting museologists from the Buffalo Museum of Science who wished to be introduced to our practices and procedures in the Department of Ornithology. Also two books were critically read for authors.

The Curator presented the ornithological section of Zoology Course 25. One seminar was held with graduate students in wildlife management at the Ontario Agricultural College, Guelph. An informal talk was given to a University class in Forestry.

Public relations activities have been varied. The Curator appeared with colleagues on the radio programme "Science Review," gave an outline of the work of the Department to visiting benefactors, and presented a digest of the Department's activities to visiting Game Overseers from the Ontario Department of Lands and Forests. Both

the Curator and the Curatorial Assistant cooperated with the Division's Department of Art and Exhibits in a special show for an open night dealing with the subject "Arctic Birds." The occasion was well attended, an open-house atmosphere prevailed, and the short talks and special exhibits appeared to be enjoyed by the public. The Curatorial Assistant gave three talks to groups outside the Museum, appeared on four radio programmes, and presented a series of eight lectures to a University Extension class.

The Curator attended the annual meeting of the American Ornithologists' Union held at Cape May, New Jersey, and the Department was represented also at the meetings of numerous other organizations both of local and international scope.

DEPARTMENT OF ICHTHYOLOGY AND HERPETOLOGY

by W. B. Scott

The Department is most fortunate to have obtained the services of another ichthyologist. Approval of the appointment of Dr. E. J. Crossman to the position of Assistant Curator was noted in last year's report. Since that announcement Dr. Crossman has taken up his duties.

Research emphasis has been placed on distributional studies during the current year, resulting in two publications.

The Curator published a checklist of the freshwater fishes of Canada, with nomenclatural and taxonomic notes, which it is hoped will point up some of the gaps in our knowledge in this field. The checklist represents another step in the preparation of The Freshwater Fishes of Canada. In this respect distribution maps for approximately 200 species of Canadian freshwater fishes are now as complete as present knowledge permits. The preparation of these maps has been one of Mr. James Woodford's main tasks during the year.

The Associate Curator's book Snakes of Ontario, which was written for the University of Toronto Press, fills a long-felt need. The two colour plates and numerous half tones make the work handsome as well as useful. The Associate Curator is continuing work on his manuscript The Reptiles of Eastern Canada, a companion volume to The Frogs, Toads and Salamanders of Eastern Canada published in 1952. In addition, he is making vigorous efforts to rearrange the herpetological study collection.

The Assistant Curator has commenced a detailed study of the haplomous fishes, with particular reference to the maskinonge and other pikes.

During the period covered by this report, specimens for study purposes have been loaned or donated to the following institutions:

Biological Bureau, University of Montreal, Quebec.

Department of Fisheries, Province of Quebec.

National Museum of Canada, Ottawa.

Department of Zoology, Ontario Agricultural College, Guelph, Ontario.

Department of Zoology, Waterloo College, Waterloo, Ontario.

Department of Natural Resources, Province of Saskatchewan.

Institute of Fisheries, University of British Columbia.

Department of Conservation, Cornell University, Ithaca, New York.

Museum of Zoology, University of Michigan, Ann Arbor, Michigan.

Institute of Oceanography of the Academy of Science, Moscow, U. S. S. R.

The Department has been privileged to supply study material to Ontario colleges recently commencing work in the fisheries field. Approximately 500 specimens involving about 60 species were supplied to Ontario Agricultural College and Waterloo College.

Material for the study collections has been received from the following organizations and individuals:

Ontario Department of Lands and Forests (A. E. Allin, C. Armstrong, J. Budd, J. Christie, C. Currie, J. Dewar, C. A. Elsey, R. G. Ferguson, K. K. Irizawa, J. Price, J. K. Reynolds, R. A. Ryder).

Ontario Department of Planning and Development (K. H. Mayall).

University of Toronto (B. Muir).

McGill University (D. R. Oliver, G. Power).

University of Saskatchewan (D. S. Rawson, F. M. Atton, C. P. Ruggles).

Institute of Fisheries, University of British Columbia (C. C. Lindsey, E. J. Crossman).

Fisheries Research Board of Canada (E. Cox, L. R. Day, A. Fleming, J. G. Hunter, J. J. Keleher, W. A. Kennedy, G. H. Lawler, A. H. Leim, R. A. McKenzie).

Museum of Zoology, University of Michigan, Ann Arbor (R. M. Bailey).

Scripps Institution of Oceanography, La Jolla, California (W. L. Klawe).

Fisheries Branch, Manitoba Department of Mines and Natural Resources (B. Kooyman).

In addition to the above, specimens from various parts of the world have been donated by many students and private individuals, including Miss L. Bograd, Mr. John Taylor, Dr. A. E. Allin, Mr. Froats, Mr. S. C. Johnston and Mr. S. L. Thompson (Herpetology). These private donations often make a particularly useful

addition to the collections. Worthy of special mention is the fine collection of Florida fishes donated by Mr. Johnston.

To all the above individuals, both professional and private, we extend our sincere thanks.

The research collections continued to exhibit healthy growth in spite of the concentration on distributional studies, and some 900 lots involving over 9000 specimens were added to the research collections. The increase in staff is partially responsible for the large amount of material catalogued, while the introduction of an improved system of cataloguing has greatly facilitated the work.

As a public service over 2000 specimens have been identified for various organizations and individuals, including Ontario Departments of Lands and Forests, and Planning and Development, Saskatchewan Department of Natural Resources, Fisheries Research Board of Canada, and numerous private individuals such as teachers and interested sportsmen. In addition, all curators have participated in several radio and television broadcasts.

The Curator prepared a 60 page account of 10 species of North American fishes as a contribution to the Committee on the Handbook of Biological Data, being prepared under the auspices of the National Research Council of the United States. In a similar vein a section was prepared for the planned revision of the List of Common and Scientific Names of the better known fishes of the United States and Canada, a project of the American Fisheries Society.

The Toronto Anglers and Hunters Association again supported the fish distributional studies by providing a grant of $800.

A graduate course in Ichthyology was presented by the Curator, and both the Curator and the Associate Curator participated in the presentation of Zoology 25. In all, approximately 110 hours of lectures and laboratory instruction were given to University students.

The Curator visited the American Museum of Natural History, in New York City, for five days to obtain records of Canadian fishes held in the research collections of that institution. The Associate Curator made a similar visit to the National Museum in Ottawa in order to study the research collection of amphibians and reptiles.

DEPARTMENT OF INVERTEBRATE PALAEOZOOLOGY

by R. R. H. Lemon

The Assistant Curator took up his duties on October 1, 1957, and since that date the major task in the Department has been one of reorganisation. Major changes in the arrangement of the display material in the public galleries are now in the planning stage and concomitant with this the study collections are to be housed separately and so arranged and catalogued as to provide the maximum convenience to researchers using the collection. The very considerable collection of type specimens has been moved and is now housed separately.

At the end of December the Assistant Curator visited the British Museum, London, and general curatorial problems, particularly those pertaining to displays and to the cataloguing and storage of study material, were discussed. Similar visits were paid to the American Museum of Natural History, New York, and the National Museum, Washington, and much useful information gained. In all these institutions friendly personal contacts were made with the curatorial staff.

In January the Assistant Curator accompanied Dr. G. Edmund and Mr. R. R. Hornell to Talara, Peru, and was engaged on geological field work in connection with the Pleistocene tar seep fauna collected there. The problems involved in the Pleistocene stratigraphy of this area are complex and, during February and March, it was found necessary to expand the work to include a study of the Pleistocene marine sediments and faunas of this whole area west of the Amotape Mountains. Several hundred specimens, mainly pelecypods and gastropods, were collected and despatched to this Department for study. Particular attention has been paid to the possibility of a direct determination of the age of the sediments by C14 analysis, and large quantities of shells, mainly pelecypods, were collected from the raised beach deposits with this object in view. Contact has been made with the University of Saskatchewan and it is hoped that arrangements can be made for the analyses to be carried out in the laboratories there.

While in Peru invaluable assistance was given by the International Petroleum Company; access to maps, air

photographs and other data were freely given, while the friendly personal interest shown by the staff of the Geological Department was greatly appreciated. In particular, a special debt of gratitude is due to Mr. J. D. Tuohy, Chief Geologist, and to Dr. G. H. MacDonald and Mr. R. Fraleigh. Early in June the Assistant Curator returned to Peru to continue field work and collecting in the Talara region.

In addition to specimens obtained by staff members a good collection of representative fossils from the Mississippian Rundle formation of the Alberta Rockies was received from Dr. C. H. Crickmay of the Imperial Oil Company, Calgary, and some material has since been supplied to him, on request, for research purposes.

Assistance has also been given to the Department of Lands and Forests, Ontario, in collecting and preparing fossils for the small museum planned at Craigleath Provincial Park.

The reorganisation of the Departmental library has involved considerable labour during the winter. Large numbers of irrelevant publications have been removed and either transferred to other departments or disposed of. The cumbersome and outmoded cataloguing system, previously in use, is now being replaced by a more compact index requiring fewer index cards. The large "separates" collection is now stored alphabetically by author and the arrangement of all other publications in the library has been simplified. A new system of loan slips has been introduced. As far as has been financially possible, a start has been made on filling the very considerable gaps in the library; several new text books and a large number of Geological Society of America Memoirs and Special Papers have been added. Steps have also been taken to ensure that all major publications of palaeontological and stratigraphical interest are received or at least noted, and several series of periodical publications, previously allowed to lapse, will be taken once more.

DEPARTMENT OF INVERTEBRATE ZOOLOGY

by G. B. Wiggins

It is particularly gratifying to be able to report that Volume Two of the Honorary Curator's monograph on dragonflies and damselflies, The Odonata of Canada and Alaska, is now in press. New material which became available recently provided data for the inclusion in the second volume of two additional items of considerable interest. The nymph of the one remaining Canadian species of Aeshna for which this stage was previously unknown was discovered, and the nymph of the genus Gomphaeschna was recognized with certainty for the first time. Dr. Walker has also made considerable progress in Volume Three, the concluding part of the monograph, with the completion of the first drafts of the manuscript for families Macromiidae and Corduliidae.

The results of the Assistant Curator's research on the caddisfly family Phryganeidae were prepared as a doctoral thesis under the direction of Dr. F. A. Urquhart. The thesis, entitled The Systematics of the Phryganeidae of the World, was submitted to the University of Toronto in conformity with the requirements for the degree of Doctor of Philosophy, and the degree was granted. Before publication this study is being expanded to include complete descriptions of the adults of all known species of phryganeid caddisflies in the world, keys for their identification, as well as complete distributional data. Additional work on the Phryganeidae, including both collecting in the field and rearing in the laboratory, has also been carried out. The Assistant Curator has completed, upon request, a tabular summary of data on the life history and ecology of caddisflies for a forthcoming handbook of aquatic biology to be published by the U.S. National Research Council. Field work on the caddisfly genus Neophylax was again continued with a collecting trip in September to Mt. Tremblant and Gatineau Park in Quebec. Several days were spent at the University of Illinois in November studying the caddisfly collection of the Illinois Natural History Survey.

As in last year's report, research and other activities of the Head of this Division are outlined along with those of the appropriate department. Dr. Urquhart has completed about three-quarters of the manuscript for

the book summarizing results of his studies on the Monarch Butterfly. With the help of co-operators in many parts of North America, tagging and field observations have been continued, resulting in some of the most significant records on movements of these butterflies yet obtained. Miss Hilda White, a temporary assistant, has again given valuable service in all aspects of this project. Two papers have been published in the past year as an outcome of the Monarch Butterfly research. The first, A discussion of Batesian mimicry as applied to the Monarch and Viceroy Butterflies, sheds new light on the classical zoological problem of mimicry. The second, Scent receptors in Lepidoptera, introduces new evidence concerning the mechanics of scent production by butterflies and moths. Also completed and submitted for publication was the manuscript for a third paper, A discussion of the use of the word "migration" as it relates to a proposed classification for animal movements. Dr. Urquhart served his final year as a member of the Council for the Society of Systematic Zoology and attended the annual meeting of the Society in Indiana. He was appointed also to the Editorial Board of the Canadian Entomologist. In the University he served on a number of examining committees for graduate students and presented the portion of an undergraduate course, Zoology 25, dealing with entomology. Eighteen popular lectures to various organizations were delivered during the year.

The research collections of insect groups on which this Department is carrying out extensive studies have continued to grow. In addition to collections made by the staff, much valuable material has again been received from other persons and institutions. Material such as this, from distant parts of North America and other continents too, is of particular importance in increasing the scope, and thus the value, of the studies being carried out here. It is our pleasure to acknowledge, with sincere thanks, the following donations. Dr. Ernst Palmen of the University of Helsinki, Finland, provided a series of pupae of a species of phryganeid caddisfly. Mr. W. Crichton of the Ontario Department of Lands and Forests has continued to make collections of caddisflies and other aquatic insect groups in northern Ontario. A large collection of dragonflies received from Dr. D. S. Rawson of the University of Saskatchewan has provided data on the distribution of many species in northern Saskatchewan. A series of adults and exuviae of species of dragonflies not previously represented in the collection was received from Mr. G. H. Beatty of Pennsylvania State University.

The collections of the Department have again been utilized in the research of workers in other museums

and universities. These include the Museum of Comparative Zoology, Harvard University; the Faculty of Biology, Bucharest, Romania; the Philadelphia Academy of Natural Sciences; the Canada Department of Agriculture; and the College of Medical Evangelists, California.

In response to an increasing number of inquiries from private persons and business concerns, the Department has continued to provide information pertaining to various kinds of invertebrate animals, including insects as well as other groups. This service has also been provided for the Ontario Department of Lands and Forests, for the Ontario Department of Health, and for various municipal bodies. The Assistant Curator gave instruction in insect identification in a training course for Sanitary Inspectors operated by the Ontario Department of Health.

Visitors to the Department included Dr. C. H. Lindroth of the Zoological Institute, Lund, Sweden, who spent two days examining the collection of carabid beetles; and Dr. D. W. Crocker of Colby College, Maine, who spent four days examining the collection of crayfish.

DEPARTMENT OF ART AND EXHIBITS

by T. M. Shortt

The Department of Art and Exhibits was established in 1948, the first department in the Royal Ontario Museum to be formed to deal exclusively with exhibition and illustration.

After a period of organization and staff training, the Department, in 1950, embarked upon a programme of redecorating and renovating the galleries allotted to the Life Sciences. This programme, under the direction of the Head and Curators, had as its objective the elimination of the forest of red showcase frames and mirroring glass which had inevitably become outdated. Our programme called for the production of an over-all pattern of colour, light and dramatically displayed animals combined with carefully worked out story-telling subject matter and labelling which would achieve accurate, attractive and educationally effective displays.

It was agreed that one of our primary objectives in our displays was to prepare a wide variety of perishable living organisms in whatever medium would insure the finest simulation of nature. In this we realize that perfection can never be fully attained, but the degree to which its artists strive for it is a reflection of the vitality of a museum.

The Gallery of Canadian Fishes, which was prepared with the financial assistance of the Canadian Department of Fisheries, was the first of the new galleries. This was officially opened on March 28, 1955. Although we now feel this gallery leaves much to be desired, it was enthusiastically received by the press and public and especially by the vast number of those who engage in fishing for sport. A request for floor plans, case design, photographs of the exhibits and accounts of techniques used in preparing the fish-casts has recently been received from the Smithsonian Institution which is currently engaged in planning a similar exhibit.

The second of the new galleries, the Gallery of Modern World Reptiles, is now in course of preparation. The importance of this gallery can be appreciated readily by those members of the staff to whom are directed the numerous inquiries about reptiles from the public. This layman interest in reptiles has been greatly increased

in the past few years by the press publicity given to the occurrence of venomous reptiles in our province. Financing of the new gallery has been made possible only through generous grants from the Carling Breweries Limited.

In spite of the many other obligations which have been imposed upon staff skills and energies, work on the new gallery has progressed remarkably well. This satisfactory progress can be attributed in large measure to the skilful assistance of Mr. Sternberg, who is undoubtedly the best in the field of museum casting and moulding.

Approximately fifty different kinds of reptiles from all over the world have been received alive. These have been studied, photographed and preserved and are now in various stages of preparation. Among the interesting forms received to date are included Queensland Frilled Lizard, Bearded Dragon, Tiger Snake, Moloch, Blue-tongued Skink and two kinds of Monitors from Australia; Puff Adder and Giant Girdle-tailed Lizard from Africa; Banded Krait and King Cobra from India; Green Iguana, Crocodile, Matamata Turtle, Cascabel, Masurana, Jacara, Emerald Tree Boa, and Basilisk from tropical America; and Coral Snake, Cottonmouth, Glass Snake, Gila Monster and several kinds of Rattlesnakes from North America. The arrival of a fourteen-foot, 126 lb. Anaconda has made necessary the construction of a large preserving tank and other preparations for this mammoth casting job which will be commenced shortly.

Thirty-six moulds have been made, ranging from a tiny two-piece mould for the American Chamaeleon to a 400 lb., 20 piece mould for the Green Iguana. Thirty casts have been made from the new moulds, all in the latex-compound technique developed by Mr. Reid. Certain new techniques have been devised in the course of this work, in preserving, in moulding and in casting, all of which contribute to more effective replicas. Notable among these is a technique which allows for a degree of shaping of the cast upon removal from the mould. By means of this method casts of snakes can be modified in shape to coil about branches, conform to ground contours or to be arranged so that one portion of the body may be looped over another. Colouring of these casts is now being undertaken.

In addition to the cast specimens, six other reptiles have been prepared through a combined taxidermy and impregnation technique.

The many valuable specimens acquired in the course of this work have been preserved carefully before casting and upon completion of the project will be entered into the research collection of the Department of Ichthyology

and Herpetology. The many hundreds of kodachrome and black and white photographs of living and freshly dead reptiles, taken by Mr. Gatti with his personal camera equipment, will also be turned over to that department eventually. These slides recording postures, patterns, colours and methods of locomotion will be invaluable during the course of exhibit preparation and afterwards will provide aid for study and teaching.

In the gallery, meanwhile, work has progressed in preparing the exhibition cases to house the specimens. Conversion of old free-standing cases into a continuous wall with windows, by means of the construction of false fronts, is nearing completion. An elevated platform which will set off the display of Canadian reptiles from the rest of the exhibit has been constructed, and a stone wall to enclose an open exhibit has been built and lighting installed within it. Much of this work has been done by Mr. Ralph Rae, a cabinet-maker who has been employed extra-clerically during the year. Mr. Rae's interest in the project and conscientious effort have proved invaluable.

In addition to the major project described above, the department has put on, with the co-operation of the research departments, special exhibitions on the occasions of the Division's two "open nights."

"Arctic Birds" night featured exhibits prepared by the Departments of Ornithology and Art and Exhibits. These exhibits focussed attention on the importance of research in the Canadian Arctic and introduced Mr. Snyder's book Arctic Birds of Canada. The exhibits using specimens from the research collection and books from the library dealt with a variety of subjects concerning birds in Arctic Canada. Other special exhibits and activities on this occasion were prepared by the Audubon Society of Canada and the Federation of Ontario Naturalists. Members of these organizations were on hand along with the Museum staff to meet the public and to assist in dispensing information.

"Reptile Night" was highlighted by a display of living reptiles. Among the species shown, the Bushmaster, Caiman Lizard and Emerald Tree Boa may have been the first individuals of their kind to be exhibited alive in Canada. The Bushmaster and two giant Aldabra Tortoises were lent by the Riverdale Zoo. Also lent to us for the evening were fine specimens of Indian Python and Boa Constrictor, by Mr. Frank Darroch of Toronto. Other exhibits included "Snake Bite and its treatment," "How a gallery specimen is made" and a special display of Mr. Logier's new book The Snakes of Ontario. The second floor studio was open to the public with Mr. Sternberg and Mr. Gatti in attendance to explain methods and to answer questions. Mr. Reid gave two brief talks in the ground floor lecture room.

Illustration work was necessarily curtailed because of the many other activities, but fifteen full page illustrations have been prepared for a forthcoming treatise by the Curator of Mammalogy.

In conformity with the Division's long-established service policy, the Department gave assistance to companies and individuals on many occasions. Some examples of this type of service rendered during the past year are the loan to Marani and Morris, architects, of specimens from our reserve display collection of molluscs as models for decorations in the main foyer of the Shell Oil Company's new building; assistance to the De Haviland Aircraft of Canada Ltd. in making motion pictures of our gallery mounts of caribou for use in a film introducing the new Canadian-made bush plane the "Caribou"; to a number of advertising agencies, constructive criticism of art work involving animal drawings for the national advertising programmes of such firms as Canadian Industries Limited, Imperial Tobacco Co., the Carling Breweries Ltd., etc.

Advice and information were given also to a number of individuals and firms on such varied subjects as moulding and casting, the properties of certain plastics, sources of supply of materials, identification of old paintings, evaluation of old animal lithographs, sources of art work for animal illustration to a local newspaper, etc. To our colleagues in several other museums in Canada and the United States information on techniques was given freely, to visitors from these institutions and by mail.

In addition to talks given on two open nights, the Department participated in three television programmes and two radio broadcasts. Mr. Reid also addressed the Scarborough Rotary Club on the Department's work and made a two weeks' tour of museums in Rochester, Syracuse, Buffalo, Albany, New York and Ottawa.

Routine activities involving repair and maintenance of existing exhibits were carried on as usual. Early in the year the Department moved from the third floor to more spacious quarters on the second floor. Moving of all equipment and supplies was carried out by the staff.

Experimental research on new materials which had shown promise of producing some revolutionary methods of making replicas of animals has been abandoned, at least temporarily, owing to the heavy programme undertaken and the shortage of staff.

LIBRARY

by E. R. McClure

Since the previous report 2,017 publications were received and catalogued, bringing the total holdings of the library to 92,482.

During the year an agreement was reached with the main University library whereby the catalogue of the library of the Division of Zoology and Palaeontology will be incorporated within the main University library catalogue. This should greatly facilitate the use of the Museum libraries by the University as a whole.

Within the Division extensive reorganization of the Invertebrate Palaeontology Department library has been carried through and a start has been made on integrating the author index with that of the general zoology library.

Special activities of the library included the arrangement of exhibits of books for the two "open nights" held by the Division during the year, in which Arctic birds and reptiles were highlighted.

Miss Eileen McClure left the Museum at the end of April and her place was taken by Miss Elizabeth McCormick, a graduate librarian, who commenced her duties on June 1st.

CHIEF TECHNICIANS

Chief Technician of Palaeozoology

The Chief Technician in Palaeozoology has been engaged for the greater part of the year on the preparation of fossil material for research purposes. For the Department of Vertebrate Palaeozoology, one section of a hadrosaur dinosaur has been completed and a second one partly finished in preparation for an open mount. Much time was spent also in preparing the Pleistocene tar seep bones received from Peru in September. In January he accompanied the Assistant Curator of Vertebrate Palaeozoology to Peru and assisted in field operations there, during which time a further 3 1/2 tons of specimens were collected from the tar seep locality near Talara.

The task of preparing for study and display purposes the very large amount of material collected in Peru will be an enormous one, but since returning to Toronto a good start has already been made and to date two skulls, several jaws and numerous small bones have been prepared.

In addition to the above projects, six weeks were spent during the summer in building new storage cupboards in the basement laboratory and in moving specimens, office equipment, and the library from the offices at the north end of the second floor gallery.

Chief Technician of Zoology

The Chief Technician in Zoology is responsible for the preparation for study purposes of all zoological specimens received by the Museum. The greater part of his time is spent on behalf of the Department of Mammalogy and Ornithology, since in the preparation of specimens for these departments specialized techniques are involved.

For the Department of Mammalogy, the following material was prepared: 134 skulls, 5 sets of antlers, 13 skeletons, and 51 skins, including 27 tanned skins. For the Department of Ornithology 41 skins and 13 skeletons were prepared for study purposes. In addition, two fish skeletons were prepared for the Department of Ichthyology and Herpetology.

Use of the Museum's colony of dermestid beetles was extended to Mr. W. L. Klawe, Inter-American Tropical Tuna Commission, Scripps Institute of Oceanography, La Jolla, California, to clean five small tuna fish for research on the skeletons. Also 13 small rodent skulls were prepared for the Saskatchewan Museum of Natural History.

Supervision and maintenance of the gallery aquaria was also carried out by the Chief Technician, while considerable time was also spent in the setting up of the live reptile exhibit for the Museum's "Reptile Night." The success of this venture owed much to loans and generous assistance by Dr. N. D. Scollard, Director of the Riverdale Zoo, and Mr. Frank Darroch of Toronto.

STAFF PUBLICATIONS

BAILLIE, James L. Christmas bird census - 1956, Toronto (Canadian Field-Naturalist, vol. 71, no. 1, 1957, p. 24)

------ Recent additions to Ontario's bird list (Ontario Field Biologist, no. 11, 1957, pp. 1-3)

------ Yellow-billed loon at Erie Beach (Prothonotary, vol. 23, no. 6, 1957, p. 40)

------ Rarities [Ruff and Glossy Ibis at Port Hope] (Curlew, vol. 2, no. 5, 1957, p. 2)

------ Jim Baillie talks about binoculars (Canadian Nature, vol. 19, no. 5, 1957, pp. 151-2)

------ [The work of the Department of Ornithology at the Royal Ontario Museum] (Audubon Outdoors, programme no. 124, Jan. 26, 1958, Pp. 5) (mimeographed)

------ An introduction to the study of birds (A series of 8 lectures (revised) given at University of Toronto Extension, Mar. 1958, Pp. 83) (mimeographed)

------ [review] The warblers of North America (Federation of Ontario Naturalists Bulletin, no. 79, 1958, p. 35)

------ Christmas bird census - 1957, Toronto (Canadian Field Naturalist, vol. 72, no. 1, 1958, pp. 42-3)

DOWNING, S. C. Mammals of the arid plains (Canadian Nature, vol. 19, no. 5, pp. 164-6)

EDMUND, A. G. On the special foramina in the jaws of certain ornithischian dinosaurs (Contribution no. 48, Royal Ontario Museum, Division of Zoology and Palaeontology, 1957, Pp. 14)

LEMON, R. R. H. Stratigraphy and palaeontology of the Williams Island formation (Proceedings Geological Association of Canada, vol. 9, 1957, pp. 21-47)

(with M. A. Fritz and A. W. Norris)

LOGIER, E. B. S. The snakes of Ontario (University of Toronto Press, 1958, pp. 1-94)

PETERSON, R. L. Moose and antlers (Special leaflet prepared for the Toronto Star, 1958, Pp. 2)

SCOTT, W. B. A list of Ontario fishes (Royal Ontario Museum, Division of Zoology and Palaeontology, 1957, pp. 1-7) (mimeographed)

SCOTT, W. B. A checklist of the freshwater fishes of Canada and Alaska (Royal Ontario Museum Division of Zoology and Palaeontology, 1958, pp. 1-30)

URQUHART, F. A. (ed.) et al. Changes in the fauna of Ontario (Contribution, Royal Ontario Museum Division of Zoology and Palaeontology, 1957, Pp 75)

URQUHART, F. A. A discussion of Batesian mimicry as applied to the Monarch and Viceroy butterflies (Contribution, Royal Ontario Museum Division of Zoology and Palaeontology, 1957, Pp. 27, 1 pl.)

------ Scent receptors in Lepidoptera (Contribution no. 49, Royal Ontario Museum Division of Zoology and Palaeontology, 1958, Pp 14, 2 plates)

------ Parasite or Host (Canadian Nature, vol. 20, no. 2, 1958, pp. 40-44)

------ A discussion of the use of the word "migration" as it relates to a proposed classification for animal movements (Contribution, Royal Ontario Museum Division of Zoology and Palaeontology, 1958, Pp 13)

WALKER, E. M. Order Grylloblattaria (in Taxonomist's glossary of genitalia in insects, ed. by S. L. Tuxen, Copenhagen)

------ (review) The neotropical species of the subgenus Aeschna sensu Selysii 1883 (Odonata) by Philip P. Calvert (Entomological News, vol. 68, no. 5, 1957, pp. 135-8)